REMARKS

The Applicant wishes to thank the Examiner for reading the subject Application. Applicants wish to briefly point out the nature of their claimed invention which is a top spin-valve GMR read sensor with a SyAP layer and a novel contiguous junction on which is formed a longitudinal magnetic bias layer and a lead overlay structure.

Fig. 3b and 3c of the Application illustrates the novel contiguous junction and lead overlay configuration of the present invention. In the prior art of lead overlay configurations, as shown in Fig. 1, longitudinal bias layers are typically formed abutting substantially vertical etched sides of the spin-valve stack while the conducting lead layers are formed over the top of the stack (the "overlay"), as shown in Fig. 1. The lead overlay configuration has proven to be advantageous compared to the more standard abutted junction lead layer configuration (where both the leads and the bias layers abut the sensor sides) , because the trackwidth of the sensor can be defined by the separation of the two overlaid leads. In the abutted junction configuration, the trackwidth is defined by the actual physical width of the sensor, which is determined by the separation of the etched opposite sides against which both the lead and the bias layers are abutted.

In the lead overlay configuration of the prior art (Fig. 1 of the subject Application), current from the lead layer must pass vertically downward through high resistance portions of the sensor, such as its capping layer and its pinning layer. In the lead overlay configuration of the present claimed invention, the spin-valve stack has sides that are etched to provide two separate vertical contact surfaces and a horizontal surface between them. The lead overlay is formed against one of the vertical contact surfaces

and over the horizontal surface, and it extends over the longitudinal bias layer which is formed against the other surface (Fig. 3c of the subject Application). The vertical and horizontal contact surfaces on which the lead overlay is formed allows the lead overlay to inject its current into the sensor in a more advantageous manner, bypassing the high resistance sensor layers. In addition, the formation of the horizontal contact surface destroys the activity of the pinned layer within the region of formation, since the surface must remove a portion of the pinned layer. This eliminates the GMR properties of the sensor within the lead overlay region, further helping to narrow the active trackwidth region.

To fully understand the advantages of the contact configuration of the present claimed invention, it is necessary to look at Fig. 3a, where the entire layer structure of the spin-valve is shown, before the formation of the novel contact surface. In this configuration, the free layer (34), which is a laminated structure, is positioned below the SyAP pinned layer (40) and is separated from it by a spacer layer (39). A pinning layer (49) and a capping layer (47), both formed of high resistivity materials, are positioned above the pinned layer. In the prior art shown in Fig. 1, the lead overlay conducting layer would be positioned on the capping layer, so its injected current must pass through both the capping and pinning layers. These layers require no current as they serve no active role in the sensing process, yet they will diminish the useful amount of current supplied to the active sensor layers.

In the present invention, the capping and pinning layers are bypassed by forming a contact surface for the lead overlay that allows the lead to inject its current at the interface between the AP2 layer (45) and the Ru layer (46) of the SyAP pinned layer.

The formation of this contact surface is shown in Fig. 3b. The position of this contact surface then allows the conducting overlay lead layer to make its electrical contact with the spin-valve at layers of high conductivity, so that the current effectively bypasses those layers of low conductivity that would reduce its magnitude. As noted above, an additional advantage of this contact surface is that it effectively destroys the properties of the SyAP layer as a result of the etching away of the AP2 layer and a portion of the Ru layer. By destroying the properties of the SyAP layer, the GMR properties of the sensor as a whole are significantly reduced or eliminated in this region and, as a result, a narrower and more sharply defined trackwidth region are obtained. We term this effect a "magnetic assist" to the trackwidth definition.

Claim Rejections- 35 USC 103

Applicants respectfully request reconsideration of the rejections of amended claims 22, 35 and 38 and claims and original claims 36 and 37 (all intervening claims being canceled herein) under 35 USC 103(a) as being unpatentable over Lin et al. (U.S. Patent No. 6,262,869) in view of Gill (U. S. Patent No. 6,538,856).

Lin discloses a spin valve sensor that includes an encapsulated keeper layer (which is not a feature of the present claimed invention). The spin valve sensor of Lin is contacted by lead and bias layers along contiguous junctions (see Lin, column 3, lines 45 et seq. and see Fig. 16 of Lin) which do not form the lead layer in the lead overlay configuration of the present claimed invention, but rather form it in an abutted junction configuration. Fig. 16 of Lin shows a lead layer (342) formed completely over a hard

bias layer, with the combination (340) abutting the entire side of the spin valve sensor. In a lead overlay configuration, the lead layer is formed over the sensor, while the bias layer abuts the side of the sensor (see Fig. 1 of the present Application). In the more conventional contiguous abutted junction configuration of Lin, the lead layer abuts the side of the sensor (through the bias layer) and, thereby, injects its current through all the layers of the spin valve, which is exactly what the present claimed invention avoids. Furthermore, in the configuration of Lin, the sensor trackwidth is determined by the physical width of the sensor, whereas in the present claimed invention, the sensor trackwidth is significantly reduced by the novel lead overlay configuration that destroys the GMR properties of the sensor within lateral regions on either side of the free layer by etching through the pinned layer.

Gill discloses a bottom spin valve sensor structure (the pinned layer being below the free layer) that is unlike the top spin valve structure of the present claimed invention. In addition, the sensor of Gill utilizes multiple current leads, so that current is injected both parallel to some layer surfaces and perpendicular to others.

Examiner argues that Lin discloses the same features as the present claimed invention, including "a top spin-valve giant magnetoresistive (GVR) sensor read head having a novel conductive lead overlay (342)" (paragraph 2 of the Detailed Action). Applicants would contend that Lin does not disclose such a conductive lead overlay, either in his figures or his claims. Indeed, Lin states: "First and second hard bias (HB) and lead layers (340) and (342).....make contiguous junctions with first and second side edges (344) and (346) of the spin valve sensor" (Lin, column 10, lines 50-56). Edges (344) and (346) are conventional contiguous junction edges that include all layers of the

sensor structure. This configuration is patentably different from the junction configuration in Claim 22 of the present claimed invention. Indeed Claim 22, as amended, clearly claims a sensor with etched sides, leads and bias layers as described within the subject application and illustrated in Fig's 3b and 3c of the subject application. Amended claims 35 and 38 claim the more specific definition of the sides. The etched sides and lead configurations of the present claimed invention differ significantly from the sides and lead configurations of Lin. Applicants would therefore argue respectfully that Lin, combined with Gill, do not suggest the lead overlay configuration of the present invention.

Applicants would also respectfully request reconsideration of the rejection of claims 36 and 37 as being unpatentable over Lin in view of Gill. As Applicants have argued above, the lead configurations of the present claimed invention differ significantly from those of Lin and/or Gill. Applicants would further respectfully argue that the structure of their claimed lead layers as claimed in claims 36 and 37 define lead layers that fulfill the objects of their invention, which is different from the invention of Lin and/or Gill and is not suggested by the combination of Lin and Gill. Lead layers that fulfill the objects of a lead overlay configuration may be significantly different from lead layers that fulfill the objects of an abutted junction configuration, such as that disclosed by Lin. Applicants would suggest that even if Lin claims a lead structure that appears to be similar to that claimed in the present claimed invention, the structure of Lin and/or Gill must be taken in the context of an effective abutted junction rather than in the context of a lead overlay configuration. Claims 36 and 37 of the present invention

provide additional limitations to independent claim 22, which Applicants would argue is patentable over Lin in view of Gill, so that claims 36 and 37 should also be patentable.

If the Examiner has any questions regarding the above application, please call the undersigned attorney at 845-452-5863

Respectfully submitted,

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